

COMPARATIVE EVALUATION OF METHODS FOR SAMPLING OF MITE *TETRANYCHUS CUCURBITAE* RAHMAN AND SAPRA¹

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ABSTRACT: Five principal methods, viz. i) Direct counting, ii) Imprinting, iii) Floatation, iv) Jarring and V) Brushing were compared for their efficiency and precision in determining the population density of *Tetranychus cucurbitae* Rahman and Sapra (Acarina: Tetranychidae), seriously infesting brinjal in Punjab, India. All the methods were equally efficient but significant difference existed in respect of time taken. Brushing method was significantly better than direct counting but not better than jarring and imprinting. Direct counting was as good as imprinting and jarring. Because of convenience and simplicity the imprinting method may be preferred for determining the population density of this mite.

DESCRIPTORS: Evaluation of sampling methods for *T. cucurbitae* (Acarina: Tetranychidae)

Methods of sampling are important in estimating the population density of various organisms. As many as five principal methods, viz. i) direct counting, ii) imprinting, iii) floatation, iv) jarring and v) brushing have been devised by different workers from time to time to determine the population of various mite species. But no comparison has been made of the available methods taken together. The object of this paper is to evaluate all these methods and find out a rapid yet accurate procedure for determining the population density of phytophagous mites.

MATERIAL AND METHODS

Five principal methods as stated above were compared for their precision and efficiency. The test mite was *Tetranychus cucurbitae* Rahman and Sapra which heavily infested *Moong* crop (*Phaseolus aureus* Linn.) at the Punjab Agricultural University experimental farm during October, 1971.

Ten plants were selected randomly and one leaf was plucked randomly from each selected plant and as such a total of fifty leaves were plucked per field for five methods. This experiment was repeated in five different fields. As the mite was confined to the lower surface of the leaf, only that surface

1 Accepted for publication: October 8, 1974

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ENT. NEWS, 86: 1 & 2: 33 - 36, January & February 1975

was taken into consideration. The descriptions of the individual methods are given below:

- i) **Direct counting:** This is the commonest of all the methods used for estimating mite population. The sampled leaf was placed into a Petri-dish containing chloroform soaked cotton to immobilize all the mites. Mites were then counted from individual leaves under stereoscopic binocular microscope. Time spent to count the mites from each leaf was recorded with the help of a stop watch.
- ii) **Imprinting method:** Venables and Dennys's (1941) method was adopted with slight modification. In this case Whatman No. 1 filter paper was placed over the undersurface of the sampled leaf and a wooden roller was rolled rapidly from base to apex and back with pressure sufficient enough to crush all the mites. The mites upon being crushed left characteristic stains on the paper which kept permanent record. The stains were deep brownish to reddish in case of active stages and pale coloured in case of eggs. The time spent in crushing and counting of stains was recorded.
- iii) **Floatation method:** The conventional floatation methods, as recommended by Jones and Pendargast (1937), Newell (1947) and Lord (1965), were modified to make these more simple in order to meet the present requirements. Individual sampled leaf was put into a specimen jar (capacity: 250 ml) containing 200 ml water and 5 ml of Teepol (a detergent supplied by Union Carbide). Teepol was added to dislodge the mites from the leaves. The jar was then capped tightly and shaken vigorously ten times. The leaf was then removed and the liquid was filtered through filter paper (Whatman No. 1). The residue which contained mobile forms and eggs was dispersed on the paper by adding few drops of water and the counts of active stages of mites were taken under stereoscopic binocular microscope. The time spent in all the three phases, viz. shaking, filtering and counting was recorded.
- iv) **Jarring method:** In this case the technique adopted by Powell and Landis (1965) was followed. A piece of cotton filter cloth was put into a Petridish (13 cm dia) and held beneath the leaf. The leaf was struck ten times with the broad end of a pen holder so as to dislodge the mites which fell on the filter cloth. The mites were entangled in cotton fibres and thus could be easily counted.
- v) **Brushing method:** Brushing machine devised by Henderson and Mcburnie (1943) was used in this experiment. Leaves were passed through two contrarotating brushes and the mites were swept into a rotating disc coated with a thick film of vaseline which acted as adhesive. Each counting disc was divided into 12 rings and 8 equal

Comparative efficiency and precision of different methods for determining population density of *Tetranychus cucurbitae* Rahman and Sapra on *Moong* (*Phaseolus aureus* Linn.) Plants

Sr. No.	Methods	Average population/leaf basing on 10 leaves					Mean	Average time in seconds					Mean
		1	2	3	4	5		1	2	3	4	5	
		Field Nos.											
1.	Direct counting	8.65	7.79	12.73	17.11	17.97	12.85	82.00	54.1	105.0	124.2	137.6	100.58
2.	Imprinting	6.76	9.53	10.81	10.98	19.25	11.47	28.9	49.7	54.0	46.6	111.20	58.08
3.	Floatation	10.46	13.39	8.87	12.34	15.39	12.09	596.8	744.4	776.0	700.1	643.7	692.20
4.	Jarring	6.83	8.05	10.16	13.79	19.75	11.52	34.0	42.1	56.3	70.3	144.7	69.48
5.	Brushing	13.80	12.91	11.84	14.28	22.21	15.01	20.3	18.8	18.7	18.6	25.9	20.46
	C.D. (p = 0.01)						N.S.						54.95
	C.D. (p = 0.05)						N.S.						59.30

sectors. Segments in the sectors were alternatively black and white. Counting was done under stereoscopic binocular microscope. As the population was heavy, counting was done from white segments in each of two sectors numbered 1, 6 or 8, 5 or 7, 4 or 2, 5 etc. and that when multiplied by 16 gave the total mite population. This counting method was followed as per the instruction sheet supplied with the machine by M/s Ciba India Limited.

RESULTS AND DISCUSSION

The statistical analysis of the data (Table 1) indicated that all the methods were equally efficient to determine the population of mites. However, there was significant difference in the time taken to operate the methods. Brushing method was superior to direct counting but the latter was as good as imprinting and jarring. Brushing, imprinting and jarring consumed least amount of time (20.46-69.48 secs). Floatation method consumed maximum time (69 2.20 secs) for estimating mite population (Table 1).

So, from the above data any method other than floatation can be adopted for quick and accurate determination of population density of *T. cucurbitae*. Brushing method demands the availability of a machine and counting discs, which may not be readily available to the workers. So, other techniques except floatation method can be followed. Imprinting method has advantage where conditions require quick sampling as under field conditions, this method keeps a permanent record which can be processed later as and when desired.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. O.S. Bindra, Professor and Head, of this Department for providing facilities and encouragements and to M/s CIBA India Limited Bombay, for making the mite brushing machine available for studies. Thanks are also due to Drs. Balraj Singh, Insect Physiologist, and G. S. Sanøhu, Entomologist (Maize) for their valuable suggestions during experimentation and improving upon the manuscript. Lastly, the financial help received from I.C.A.R., New Delhi, is also duly acknowledged.

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